PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Evaluate Little Walla Walla Screening Facility

BPA project number: 20145
Contract renewal date (mm/yyyy): 10/1999 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Oregon Department of Fish and Wildlife

Business acronym (if appropriate) ODFW

Proposal contact person or principal investigator:

Name	Richard W. Carmichael
Mailing Address	211 Inlow Hall, EOU, 1410 L Avenue
City, ST Zip	La Grande, OR
Phone	1-541-962-3777
Fax	1-541-962-3067
Email address	odfw2@eosc.osshe.edu

NPPC Program Measure Number(s) which this project addresses
7.4L.1, 7.5, 7.10, 10.5

FWS/NMFS Biological Opinion Number(s) which this project addresses
No biological opinions address the Walla Wall Screening Facility Evaluation

Other planning document references
Walla Walla River Subbasin Salmon and Steelhead Plan (CTUIR and ODFW 1989), draft Walla Walla Subbasin Master Plan (CTUIR and ODFW 1998)

Short description
Evaluate juvenile salmonid passage and migration at the newly constructed Little Walla Walla Bypass and Trapping Screening Facility. Investigate fish injury, delay, and entrainment, and measure water velocities at facility structures.

Target species
Summer steelhead, spring chinook salmon, bull trout

Section 2. Sorting and evaluation

Subbasin
Lower Mid-Columbia / Walla Walla Subbasin

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☒ Anadromous fish ☐ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☐ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☐ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20524	Multi-Year Plan Walla Walla Anadromous Fish Plan
20145	Evaluate Little Walla Walla Screening Facility
8802200	Walla Walla Fish Passage Operations
9601100	Juvenile Fish Passage Improvement - WW River
9601200	Adult Fish Passage Improvement - WW River

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
8805302	Design and Construct NEOH Hatchery for WW	Source of fish for testing
9000501	Walla Walla Natural Production M&E	Monitor natural production at screening facility

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
	New Proposal	

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Prepare for facility testing	a	Design and construct traps and fish holding facilities
1		b	Test operate the facility
1		c	Recruit and hire project staff
1		d	Procure test fish and equipment
1		e	Develop study designs
2	Evaluate passage of juvenile fish through the bypass facility	a	Assess fish injury and mortality at design flow within facility components
2		b	Determine screening efficiency and impingement
2		c	Determine travel time and recovery rates within facility components
3	Evaluate trapping of fish at facility	a	Assess fish injury and mortality at standard trapping operations
3		b	Determine screen efficiency at trap pumpback screens
4	Measure water velocities at key locations	a	Measure velocities at facility screens
4		a	Measure velocities at bypass entrance
5	Monitor salmonid migrants	a	Operate bypass facility to monitor passage of salmonid migrants
5		a	Identify, count, and examine salmonid migrants

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	4/2000			20.00%
2	5/2000	7/2000	Assess injury,delay, screen efficiency		50.00%
3	7/2000	9/2000	Assess injury, screen efficiency		15.00%
4	4/2000	7/2000	Measure water velocity		5.00%
5	3/2000	9/2000	Identify, count migrants		10.00%
				Total	100.00%

Schedule constraints
Facility construction may not be completed as scheduled, delaying start of evaluation

Completion date
9/2001

Section 5. Budget

FY99 project budget (BPA obligated): $ 0

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%45	109,795
Fringe benefits		%17	43,072
Supplies, materials, non-expendable property		%2	6,000
Operations & maintenance		%4	10,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Computer, bypass trap	%1	4,500
NEPA costs	NA		0
Construction-related support	NA		0
PIT tags	# of tags: NA		0
Travel		%2	6,910
Indirect costs	35.5%	%25	62,400
Subcontractor			0
Other			0
TOTAL BPA FY2000 BUDGET REQUEST			$242,677

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
Total project cost (including BPA portion)			$242,677

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$257,955			

Section 6. References

Watershed?	Reference
☐	Cameron, W.A. and S.M. Knapp. 1993. Pages 5-48 in S.M. Knapp, editor. Evaluation of juvenile fish bypass and adult fish passage facilities at water diversions in the Umatilla River. Annual Report 1992. DOE/BP01385-3, BPA, Portland, Oregon
☐	Cameron, W.A., S.M. Knapp, and B.P. Schrank. 1994. Pages 1-76 in S.M. Knapp, editor. Evaluation of juvenile fish bypass and adult fish passage facilities at water diversions on the Umatilla River. Annual Report 1993. DOE/BP-01385-4, BPA, Portland, OR
☐	Cameron, W.A., S.M. Knapp, and B.P. Schrank. 1995. Pages 1-98 in S.M. Knapp, editor. Evaluation of juvenile fish bypass and adult fish passage facilities at water diversions on the Umatilla River. Annual Report 1994. DOE/BP-01385-5, BPA, Portland, O
☐	Cameron, W.A., S.M. Knapp, and R.W. Carmichael. 1997. Evaluation of juvenile salmonid bypass facilities and passage at water diversions on the lower Umatilla River. Final report to Bonneville Power Administration, Portland, OR
☐	CTUIR (Confederated Tribes of the Umatilla Indian Reservation) and ODFW (Oregon Department of Fish and Wildlife). 1989. Walla Walla River subbasin - salmon and steelhead plan. Prepared for the Northwest Power Planning Council, Portland, Oregon
☐	CTUIR (Confederated Tribes of the Umatilla Indian Reservation) and ODFW (Oregon Department of Fish and Wildlife). 1998. draft Walla Walla subbasin master plan. Prepared for the Northwest Power Planning Council, Portland, Oregon

☐	Hayes, M.C., S.M. Knapp, and A.A. Nigro. 1992. Pages 53-103 in S.M. Knapp, editor. Evaluation of juvenile fish bypass and adult fish passage facilities at water diversions in the Umatilla River. Annual and interim progress reports. DOE/BP-10385-2, BPA
☐	Hosey and Associates. 1988a. Evaluation of the effectiveness of fish protection facilities, Chandler facility evaluation. Report of Hosey and Assoicates Engineering Company and Fish Management Consultants to U.S. Bureau of Reclamation, Yakima, WA
☐	Hosey and Associates. 1988b. Evaluation of the effectiveness of fish protection facilities, Columbia facility evaluation. Report of Hosey and Associates Engineering Company and Fish Management Consultants to U.S. Bureau of Reclamation, Yakima, WA
☐	Hosey and Associates. 1989. Evaluation of the effectiveness of fish protection facilities, Roza facility evaluation. Report of Hosey and Associates Engineering Company and Fish Management Consultants to U.S. Bureau of Reclamation, Yakima, WA
☐	Hosey and Associates. 1989. Evaluation of the effectiveness of fish protection facilities, Roza and Easton screening facilities. Report of Hosey and Associates Engineering Company and Fish Management Consultants to U.S. Bureau of Reclamation, Yakima, WA
☐	Knapp, S.M. and D.L. Ward. 1990. Pages 1-32 in A.A. Nigro, editor. Evaluation of juvenile fish bypass and adult fish passage facilities at Three Mile Falls Dam, Umatilla River. Annual Report 1990. DOE/BP-01385-1, BPA, Portland, Oregon
☐	Mueller, R.P., C.S. Abernethy, and D.A. Neitzel. 1995. A fisheries evaluation of the Dryden fish screening facility. Bonneville Power Administration, Report DOW/BP-00029-2.
☐	NMFS (National Marine Fisheries Service). 1990. Fish passage facilities functional design guidelines and supplemental criteria. National Marine Fisheries Service, Portland, Oregon.
☐	Neitzel, D.A., C.S. Abernethy, E.W. Lusty, and L.A. Prohammer. 1985. A fisheries evaluation of the Sunnyside Canal fish screening facility, Bonneville Power Administrationk Report DOE/BP-1830-1.
☐	Neitzel, D.A., C.S. Abernethy, and E.W. Lusty. 1987. A fisheries evaluation of the Richland and Toppenish/Satus Canal fish screening facilities. Bonneville Power Administration, Report DOE/BP-1830-2.
☐	Neitzel, D.A., C.S. Abernethy, E.W. Lusty, and S.J. Wampler. 1988. A fisheries evaluation of the Richland and Wapato Canal fish screening facilities. Bonneville Power Administration, Report DOE/BP-1830-3.
☐	Neitzel, D.A., C.S. Abernethy, and E.W. Lusty. 1990a. A fisheries evaluation of the Wapato, Sunnyside, and Toppenish Creek Canal fish screening facilities. Bonneville Power Administration, Report DOE/BP-1830-6.
☐	Neitzel, D.A., C.S. Abernethy, and G.A. Martenson. 1990b. A fisheries evaluation of the Westside Ditch and Town Canal fish screening facilities. Bonneville Power Administration, Report DOE/BP-1830-9.

☐	Neitzel, D.A., C.S. Abernethy, and E.W. Lusty. 1991. Evaluation of rotating drum screen facilities in the Yakima River Basin, south-central Washington State. American Fisheries Society Symposium 10:325-334.
☐	NPPC (Northwest Power Planning Council). 1994. Columbia River basin fish and wildlife program. Northwest Power Planning Council, Portland, Oregon.
☐	Snedecor, G.W., and W.G. Cochran. 1989. Statistical Methods. Iowa State University Press, Ames, Iowa.
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PART II - NARRATIVE

Section 7. Abstract

The management goal in the Walla Walla River subbasin is the restoration of salmonid fish species historically produced in the basin, including summer steelhead, spring chinook salmon, and bull trout. Restoration activities include artificial production releases, supplementation of natural production, and construction of hatchery, acclimation, passage, and canal screening facilities. Irrigation diversions seasonally block or impede juvenile and adult migrants and are not all screened. Planned construction of a new bypass and screening facility at the Little Walla Walla Diversion is scheduled for completion in 1999. The goal of the Little Walla Walla Screening Facility Evaluation is to ensure the facility is operated as designed, that fish are being safely guided through or trapped at the facility, and that water velocities meet screening criteria for protection of fish. Ancillary monitoring would provide information on movement and composition of salmonid migrants. Adequate protection of fish at screening facilities is necessary to ensure, in part, a successful fisheries restoration program in the Walla Walla basin.

Section 8. Project description

a. Technical and/or scientific background

Measures to enhance summer steelhead (*Oncorhynchus mykiss*) and restore spring chinook salmon (*O. tshawytscha*) populations in the Walla Walla River basin in northeast Oregon and southeast Washington are currently being addressed through the draft Walla Walla Subbasin Master Plan (CTUIR and ODFW 1998). Summer steelhead numbers have declined in recent years to where the sport fishery in Oregon has been eliminated and spring chinook salmon were extirpated from the basin in the 1920's (CTUIR and ODFW 1989). Bull trout are currently listed as an endangered species and exist in small populations in the upper watershed, but true numbers in the lower basin are unknown. Irrigation is a principal water use limiting fish production in the subbasin by decreasing water quality and quantity, and irrigation diversions seasonally block or impede juvenile and adult migrants. Limited information on juvenile salmon, steelhead, and bull trout migrations has been obtained only through trap boxes catches or minimal sampling.

The fisheries restoration program in the Walla Walla River is in its initial phases and includes artificial production releases, supplementation, broodstock collection, associated monitoring and evaluation activities, passage improvement, flow enhancement, and various structural facilities for program implementation. Facilities needed to implement the program include a new juvenile salmonid screening and trapping facility and an adult fish ladder at the Little Walla Walla Diversion to improve passage for fish. This facility currently has no juvenile bypass and inadequate screening and trapping capabilities. Scheduled for completion in 1999, the screening facility will begin operation in fall 1999. However, design operation and full protection of juvenile salmonids cannot be ensured without a biological evaluation of the facility and measurement of hydraulic parameters. The absence of monitoring and evaluation information would leave unresolved the question of whether juvenile salmonids are being safely bypassed, trapped, or transported and whether biological and engineering criteria are being met.

The goal of the Little Walla Walla Screening Facility Evaluation is to ensure juvenile salmonids are truely protected as they are guided through the screening and bypass facility or as they are trapped during transport operations in low river flow. Evaluations of new screening facilities in other basins have been shown to be necessary to tweak facility operations.and identify specific passage problems related to design or maintenance. Evaluation efforts in the Umatilla River basin indicated that specific facility designs caused delay, that fish were injured passing through diffusers or they were entrained in the canal, that impingement on screens could be a problem, that velocities at screens did not necessarily meet criteria for salmonid fry, and that facilities were not always operated as designed (Cameron and Knapp 1993, Cameron et al. 1994, 1995, 1997, Hayes et al. 1992, Knapp and Ward 1990). Facility evaluations at diversions on the Yakima River had similar findings in regard to faulty designs, passage problems, or maintenance needs (Hosey and Associates 1988a, 1988b, 1989, 1990; Mueller et al. 1995; Neitzel et al. 1985, 1987, 1988, 1990a, 1990b, 1991).

The bypass and trapping facility also provides an opportunity to monitor the migration of juvenile salmonids in the system, including bull trout, and obtain preliminary information on abundance and seasonal movement patterns. Information on juvenile migrants is very limited in the Walla Walla subbasin (CTUIR and ODFW 1989). Screening facility evaluations on the Umatilla River provided valuable information on natural migrants as fish were concurrently monitored during evaluations or with test operation of the facilities. In addition to the need to monitor juvenile salmonid migrants, information on juvenile lamprey is also severly lacking and in need of documentation.

b. Rationale and significance to Regional Programs

Providing passage and protective screens at irrigation diversions on tributaries is a key component to reducing salmon and steelhead mortality (NPPC 1994; 7.10). It is recognized regionwide that unscreened or poorly screened diversions contribute to salmon and steelhead losses throughout the Columbia River Basin. The FWP calls for using existing expertise of federal, state, tribal entities and others to accerlerate implementation of screening and passage measures and to conduct statistically valid evaluations of screening facilities to ensure fish are adequately protected (NPPC 1994; 7.10A.2).

Production facilities in the Walla Walla subbasin for supplementation of natural stocks are part of the Northeast Oregon Production Facilities measure (7.4L.1). Such facilities will provide outplanting of millions of juvenile migrants that will use newly constructed passage and screening facilities. Adequate protection of these fish at passage facilities is necessary to safeguard the supplementation investment. Biological monitoring and

evaluation studies that accompany supplementation would be enhanced by additional monitoring at the Little Walla Walla Screening Facility.

Monitoring of bull trout numbers at the Little Walla Walla Screening Facility is part of the measure addressing bull trout mitigation (NPPC 1994; 10.5). Information on the status and movement of of bull trout populations in the lower Walla Walla River can be obtained through periodic monitoring at the facility.

Pacific lamprey are also recognized as an important weak stock (NPPC 1994; 7.5F). Further information on their status, life history, migrations, and habitat requirements is needed to address their declining numbers. This information can be partially obtained through evaluation activities at the Little Walla Walla facility.

c. Relationships to other projects

This project would immediately follow construction completion of the Little Walla Walla Screening Facility, which is part of the project to improve juvenile fish passage (9601100). Preliminary project activities would include interaction with construction engineers to become knowledgable with facility design. During the evaluation process, engineers and biologists with National Marine Fisheries Service would be consulted to discuss criteria for biological and engineering designs. Project staff would also work with the managing irrigation district in the day-to-day activities of the facility and to learn facility operation and with the Fish Passage Operations project. Project staff would also work with local property owners affected by facility construction and operation. Acquisition of test fish would require coordination with local production facilities (NEOH hatchery) and responsible agencies (ODFW, CTUIR). Results from evaluation studies would be shared with NMFS engineers, state and tribal entities, Walla Walla Passage Operations project (8802200), and irrigation district managers. We will use existing forums in the Umatilla basin for dissemination of information from Walla Walla basin research and evaluations (Umatilla Management, Monitoring and Evaluation Oversight Committee, Umatilla Passage TWG meetings).

Information on juvenile salmonid migrants and bull trout numbers would be shared with the Walla Walla Natural Production M&E (9000501) and with affected resource managers within the states of Washington and Oregon. Information on juvenile lamprey abundance would be shared with the Pacific Lamprey Research and Restoration Project (9402600). Work at the juvenile facility would entail interaction with the Adult Fish Passage Improvement project (9601200) during construction and operation of the adult fish ladder at the Little Walla Walla diversion dam.

Project staff would involve local schools, organizations, landowners, other agencies, and other scientists in their activities either through field opportunities, classroom lectures, sharing of expertise, equipment, or information, or obtaining permission for specific work. Cooperation and collaboration amongst all parties and agencies involved in the Walla Walla basin would allow sharing of information to fill database gaps, alert operators to problem areas, provide staff assistance during field sampling, and opportunities for participation in joint studies. Project staff would provide answers to questions on fish and wildlife issues from the public who visit our office or the field site and assist in promoting public awareness of fisheries restoration in the Walla Walla basin..

d. Project history (for ongoing projects)

This is a newly proposed project and has no history.

e. Proposal objectives

1. Prepare for facility testing
Assumptions: Ability to construct traps and fish holding facilities, coordinate test fish acquisition, learn facility operation, obtain funding, and hire staff.
Products: Readiness in study design, facilities, and staff to conduct the facility evaluation in spring 2000.

2. Evaluate passage of juvenile fish through the bypass facility
Null hypothesis: There is no significant difference between injury of treatment fish relase in the facility and control fish release in the trap.
Null hypothesis: There is no significant difference in travel rate or injury between test fish released in the day and test fish released at night or between different test species.
Null hypothesis: Differences in mean 50% travel time, median travel speed, or percent recapture of fish released at two or more locations are not significantly different.
Assumptions: Ability to conduct valid statistical tests with the facility in a design operation mode.
Products: Results of valid statistical tests showing injury levels, travel rates, and percent recapture and significant differences. Results of screen efficiency tests; observations on impingement on vertical screens. Observations of facility operation, problems, and recommendations on proper facility operation.

3. Evaluate trapping of fish at the facility
Null hypothesis: There is no significant difference in condition or mortality of fish trapped and transported and fish not trapped or transported.
Assumptions: Ability to conduct valid statistical tests during trap and transport operations.
Products: Results of valid statistical tests showing injury levels between trapped/transported and non-transported fish. Observations of problems with trapping and transport, and recommendations on facility operation.

4. Measure water velocities at key locations
Assmuptions: Ability to adequately measure velocities at vertical screens, entrance to bypass channel, and other key locations within design operation of the facility.
Products: Measurements of water velocities at screens and key locations, within 20%, 50%, and 80% of the water column.

5. Monitor salmonid migrants
Assumptions: Ability to operate trap on a routine basis to capture river-run fish and monitor the outmigration or movement of salmonids and lamprey.
Products: Counts of fish captured in traps, species identification, general condition, and lengths.

f. Methods

We will conduct tests to evaluate injury, rate of travel, recapture, screen efficiency, and impingement, and measure screen and bypass channel velocities. We will conduct tests to evaluate trap and transport effects on fish.

Test Fish: Test fish will be obtained from the South Fork Walla Walla facility or from Lyons Ferry Hatchery. We will transport fish in an aerated slip tank from the production facility to the test site. Holding facilities will be constructed to hold fish until test use.

Injury Tests (Obj 2,3): We will release one to three groups of uniquely marked treatment and control fish on two to three consecutive dates to serves as test replicates. Treatment fish will be released upstream of the facility structure being evaluated; control fish will be released downstream from the facility structure or in a recovery trap to assess handling or trap-caused injury. Injury will be evaluated on all fish from each replicated group prior to release to establish pre-release condition. Injury rates (amount and severity) of recaptured treatment and control fish will be compared to determine facility-caused injury. We will mark each replicate treatment and control group with a color mark to differentiate the groups. Pre-release injury will be assessed at the time of marking. We will use parametric T-tests to test the null hypothesis that mean net injury for treatment minus control was significantly greater than zero (Cameron et al. 1997). Pairing of replicate treatment and control groups will be based on common release times. We will use a significance level of 0.10 (one-tailed) for all tests.

Bypass Injury Tests (Obj 2): Separate injury tests will be conducted in the upper and lower segments of the fish bypass. Upper bypass tests will include headgate injury, canal injury, and screen injury tests. Lower bypass tests will include bypass downwell and outfall tests. During upper bypass tests, traps at the bypass weir will be operated on a continuous basis for at least 96 h after test fish are released. In the lower bypass tests, trapping at the outlet will occur during dayling for several hours after fish releases. Tests will be conducted under normal operating conditions. After capture, test fish will be separated from river-run fish and examined for scale loss, injuries, and test marks. Time of release and capture will be recorded.

Travel Rate and Recapture (Obj 2): We will record release and recapture times of fish during injury tests to determine the time for the fish to travel from the release location to the recapture site. Rate of fish movement in the upper bypass will be quantified by calculating the average time to recapture 50% (median travel time) and 95% of the test fish released. For tests conducted in the lower bypass, fish movements will be quantified by plotting average cumulative percent recapture of test fish against average time after release. Cumulative percent recapture will be corrected for trap efficiency.

Screen Efficiency and Impingement (Obj 2): Screen efficiency (leakage) and impingement (rollover) will be evaluated by releasing unmarked fry-sized fish upstream of the screens and recapturing them in fyke nets deployed behind the screens and at the bypass downwell trap. Marked fish will be released in the mouth of the fyke nets and at the bypass channel entrance to determine trap capture efficiencies. We will dye the fish with bismark brown or mark with a color mark. Drum screen efficiency tests will be replicated three times, with test intervals at 48 hours. We will use about 300 fish per release group. Screen efficiencies will be estimated as the percentage of fish guided safely past the screens. Estimates will be based on the number of fish captured behind the screens in fyke nets and the number of fish captured in the bypass channel trap, corrected for trap efficiency.

Water Velocities (Obj 4): We will measure water velocities in front of the vertical louver screens and at the entrance to the bypass channel to assess compliance with velocity criteria developed by the NMFS (1990). The criteria specifies the requied velocity for

flow perpendicular (approach) and flow parallel (sweep) to the screen face. We will measure velocities at 20%, 50%, and 80% of submerged screen depth at the upstream, mid-section, and downstream sections of the screens. We will use a Marsh McBirney (Model 2000) flowmeter.

Monitor Migration (Obj 5): We will use the inclined plane trap in the bypass channel to monitor the outmigration of juvenile salmonids during evaluation tests and during test operation of the facility and trap.

g. Facilities and equipment

1. *Traps*: We will design and construct an inclined plane trap for use in the bypass channel at the screening facility and fyke nets to place behind the vertical louver screens at the entrance to the canal and at the terminus of the bypass outlet. Net pens, circular holding tanks with inflow and outflow will also be constructed. We will use facilities held over from the Umatilla River screening evaluations if they apply.

2. *Transport*: Transport of fish during test fish acquisition and test fish releases will be provided by a 250-gal slip tank loaded into the bed of a 3/4-ton pickup truck. The tank will be supplied with an auxilliary aeration system. At times when few fish are transported, we will use 30-gal garbage cans.

3. *Offices*: We will set up a temporary office at the screening facility, using a travel trailer surplused from the USFWS. Office space in Hermiston will be used during non-field operations. Office space in Milton Freewater or Walla Walla will be secured during field sampling.

4. *Computer Equipment*: We will purchase a pentium desktop computer for word processing, data summarization and analysis, and graphics development. MS Office will be the standard software used and SAS will be the statistical software package. A 56kbps modem will be connected for email exchange and internet access.

5. *Vehicles*: Two vehicles will be procured for transporting project staff to meetings and field sites during sampling and transporting of equipment and the slip tank. One vehicle will remain with the project year-round. Vehicles will be obtained from DAS.

6. *Technical Equipment*: Water velocities will be measured with a Marsh McBirney electromagnetic flowmeter (Model 2000). If underwater videography is attempted, we will use a Sony (model HMV-352) underwater video camera).

h. Budget

Personnel costs include a full-year salary for one project biologist (assistant project leader) and 1/2-year salary for a project leader, and partial salaries for the program leader, office support, and seasonal workers. Fringe benefits are 36% of permanent salaries and 45% of seasonal salaries. Non-expendable items include one pentium computer and one inclined plane trap. Costs for Supplies cover training, field supplies, and field clothing. O&M costs will be shared partially among other BPA-funded projects and will cover office and

equipment rent, office supplies, utilities, telephone + internet access. Travel includes vehicle rent, mileage, and perdiem costs.

Section 9. Key personnel

Program Leader: Richard W. Carmichael; FTE = 0.08
Project Leader: Suzanne M. Knapp; FTE = 0.5
Ass't Project Leader: (unknown); FTE = 1
Seasonal workers: FTE = 3

Program Manager
Richard W. Carmichael

Education

1984 - M.S., Fisheries Science, Oregon State University, Corvallis, OR
1979 - B.S., Fisheries Science, Oregon State University, Corvallis, OR

Current Employment

Oregon Department of Fish and Wildlife, Fish Research and Development, La Grande, OR. July 1990 - present. Program Leader - Executive Manager for NE Oregon Fisheries Research and Development Program. Primary responsibilities are to develop and direct implementation of a complex research program to evaluate success of protecting, reestablishing, and restoring ESA listed and non-listed stocks in eastern Oregon. Oversees the work of 14 full-time fisheries biologists and up to 8 projects, and represents ODFW on regional and national scientific committees. Adjunct professor at Eastern Oregon University.

Past Employment

Fisheries Research Biologist (Project Leader), Oregon Department of Fish and Wildlife, La Grande, OR. December 1983 to July 1990.
Fisheries Research Biologist (Assistant Project Leader), Oregon Department of Fish and Wildlife, La Grande, OR. March 1983 to December 1983.
Project Assistant (Experimental Biology Aid), Oregon Department of Fish and Wildlife, La Grande, OR. October 1982 to March 1983.

Expertise

Expertise in fisheries research project development and implementation, personnel management, budget development and tracking, technical report writing, natural production and supplementation research, hatchery effectiveness, hatchery and wild fish interactions, life history, harvest assessment, stock assessment, passage evaluation, straying, captive broodstock, statistical analysis, coded-wire tag implementation and assessment, bass and trout ecology, creel censusing.

Recent publications

1998. Status review of the spring chinook salmon hatchery program in the Grande Ronde River Basin, Oregon. Lower Snake River Compensation Plan Status Review Symposium, USFWS, Boise, ID.

1998. Status review of the spring chinook salmon hatchery program in the Imnaha River Basin, Oregon. Lower Snake River Compensation Plan Status Review Symposium, USFWS, Boise, ID.

1997. Straying of Umatilla River hatchery origin fall chinook salmon into the Snake River. (R.W. Carmichael). *In* Genetic effects of straying of non-native hatchery fish into natural population (R.S. Waples, convenor). National Oceanic and Atmospheric Administration, Seattle, WA.

1995. Status of supplementing chinook salmon natural production in the Imnaha River basin. *In* Uses and effects of cultured fishes in aquatic ecosystems (H.L. Shramm, Jr., and R.G. Piper, eds.)

1994. A comparison of the performance of acclimated and direct stream released, hatchery -reared steelhead smolts in Northeast Oregon. (Whitesel, T.A., P.T. Lofy, R.W. Carmichael, R.T. Messmer, M.W. Flesher, and D.W. Rondorf) Pages 87-92 *in* High performance fish (D.D. MacKinlay, ed.); Fish Physiology Section, American Fisheries Society, Fish Physiology Association, Vancouver, British Columbia, Canada.

Project Leader
Suzanne M. Knapp

Education

1981 M.S., Biology, Eastern Washington University, Cheney, WA
1976 B.S., Environmental Health, Boise State University, Boise, ID
1974 B.S., Zoology, The College of Idaho, Caldwell, ID
1971 A.A., Liberal Arts, Long Beach City College, Long Beach, CA

Current Employment

8/91 - Present **Fisheries Research Biologist**, Oregon Department of Fish and Wildlife, 80866 Hwy 395 No., Hermiston, OR 97838

Project leader for the Umatilla River Outmigration and Survival Study. Primary responsibilities are to identify and oversee research goals and objectives, coordinate and administer project operations, develop and monitor project budget, conduct data analyses, prepare reports, presentations, and proposals, personnel management, collect scientific data, participate in interagency planning/coordination meetings, and provide technical assistance to agency staff. Also project leader on adult salmonid passage study at Snake River dams (1991-1993), using electronic tunnel and underwater video technology.

Past Employment

11/89 - 8/91 **Fisheries Research Biologist** (Assistant Project Leader), Oregon Dept. Fish and Wildlife,Hermiston, OR
2/87 - 10/89 **Fishery Biologist**, U.S. Army Corps of Engineers, Umatilla, OR
4/86 - 6/86 **Hydroacoustic Technician**, Parametrix, Bellevue, WA
9/84 - 4/85 **Fishery Biologist**, U.S. Fish & Wildlife Service, Cook, WA
7/83 - 1/84 **Fishery Biologist**, U.S. Fish & Wildlife Service, Cook, WA
3/83 - 7/83 **Biological Technician**, National Marine Fisheries Ser., Pasco, WA
3/78 - 12/78 **Aquatic Biologist**, Envirosphere Company, Satsop, WA

Expertise

Thirteen years experience in salmonid passage and migration on mainstem Columbia River and tributaries. Five years of experience in macroinvertebrate taxonomy and fish food habits. Expertise in technical report writing, personnel management, project planning and development, budget development, passage/bypass facility designs and operation at dams and canals, smolt monitoring, fish marking/tagging, aquatic entomology, computer usage.

Publications

Cameron, W.C., S.M. Knapp, and R.W. Carmichael. 1997. Evaluation of juvenile salmonid bypass facilities and passage at water diversions on the lower Umatilla River. Final report to Bonneville Power Administration, Portland, Oregon (DOE/BP-01385-7).

Knapp, S.M., J.C. Kern, W.A. Cameron, S.M. Snedaker, and R.W. Carmichael. 1998a. Evaluation of juvenile salmonid outmigration and survival in the lower Umatilla River basin. Annual progress report 1995-1996 to Bonnville Power Administration, Portland, Oregon.

Knapp, S.M., W. A. Cameron, J.C. Kern, and R. W. Carmichael. 1998b. Evaluation of juvenile salmonid outmigration and survival in the lower Umatilla River basin. Annual progress report 1996-1997 to Bonneville Power Administration, Portland, Oregon.

Knapp, S.M. and C.J. Knutsen. 1992. Evaluation of passage of adult salmon and steelhead at Lower Granite Dam and of electronic and underwater video technologies as passage evaluation methods. Report to the U.S. Army Corps of Engineers, Walla Walla District.

Section 10. Information/technology transfer

Progress reports will be written annually and distributed to those on the BPA publications list or placed on the internet. Final completion report will be written at the conclusion of the project. Quarterly progress reports will be distributed to key entities and agencies and BPA. Results will be presented at Umatilla/WallaWalla Passage TWG meetings, and Umatilla/Walla Walla Mangament, Monitoring and Evaluation Oversight Committee meetings. Presentations will be provided at screening and passage workshops and BPA or CBFWA public reviews and to the Walla Walla Basin Watershed Council.

Congratulations!